

# **Utah Division of Air Quality**

## **Exceptional Event Demonstration Ozone Exceedance at the Hawthorne Monitoring Station**

**Due to Nevada Wildfires - Bison, Eight Mile  
and North Creek Fires**

**Event Date – July 9, 2013**

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## Introduction

An exceptional event, as defined in 40 CFR §50.1(j), is an event that:

- ❖ Affects air quality;
- ❖ Is not reasonably controllable or preventable; and
- ❖ Is caused by human activity that is unlikely to recur at a particular location or is a natural event.

As specified in 40 CFR 50.14(c)(3)(iv), to justify the exclusion of air quality data from National Ambient Air Quality Standards determination, the following must be demonstrated:

1. The event was not reasonably preventable;
2. There was a clear, causal relationship between the 8-hour ozone concentrations at the impacted monitors and the specified event;
3. The measured value was in excess of normal historical fluctuations; and
4. No exceedance would have occurred but for the event.

This report documents that the exceedance of the ozone 8-hour standard of 75 ppb that occurred on July 9, 2013 at the Hawthorne monitoring station, meets the above criteria because Nevada wildfires contributed to the exceedance and that the natural wildfires could not be reasonably prevented or controlled.

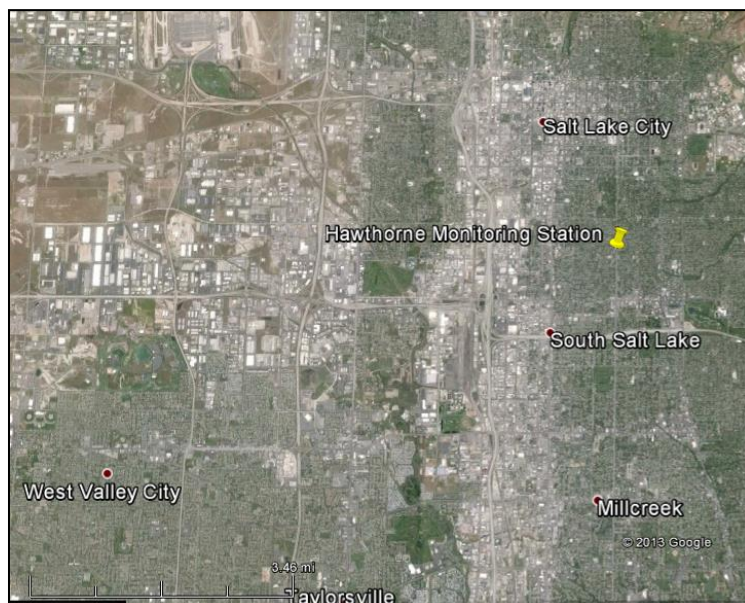
Ozone 8-hour Exceedance: Hawthorne – 0.081 ppm or 81 ppb

### Hawthorne Monitoring Station Description

Longitude: 111.8721      Latitude: 40.7343  
AQS#: 49-035-3006  
Address: 1675 South 600 East, Salt Lake City, Salt Lake County  
Elevation (M): 1306

### Monitoring Station Setting

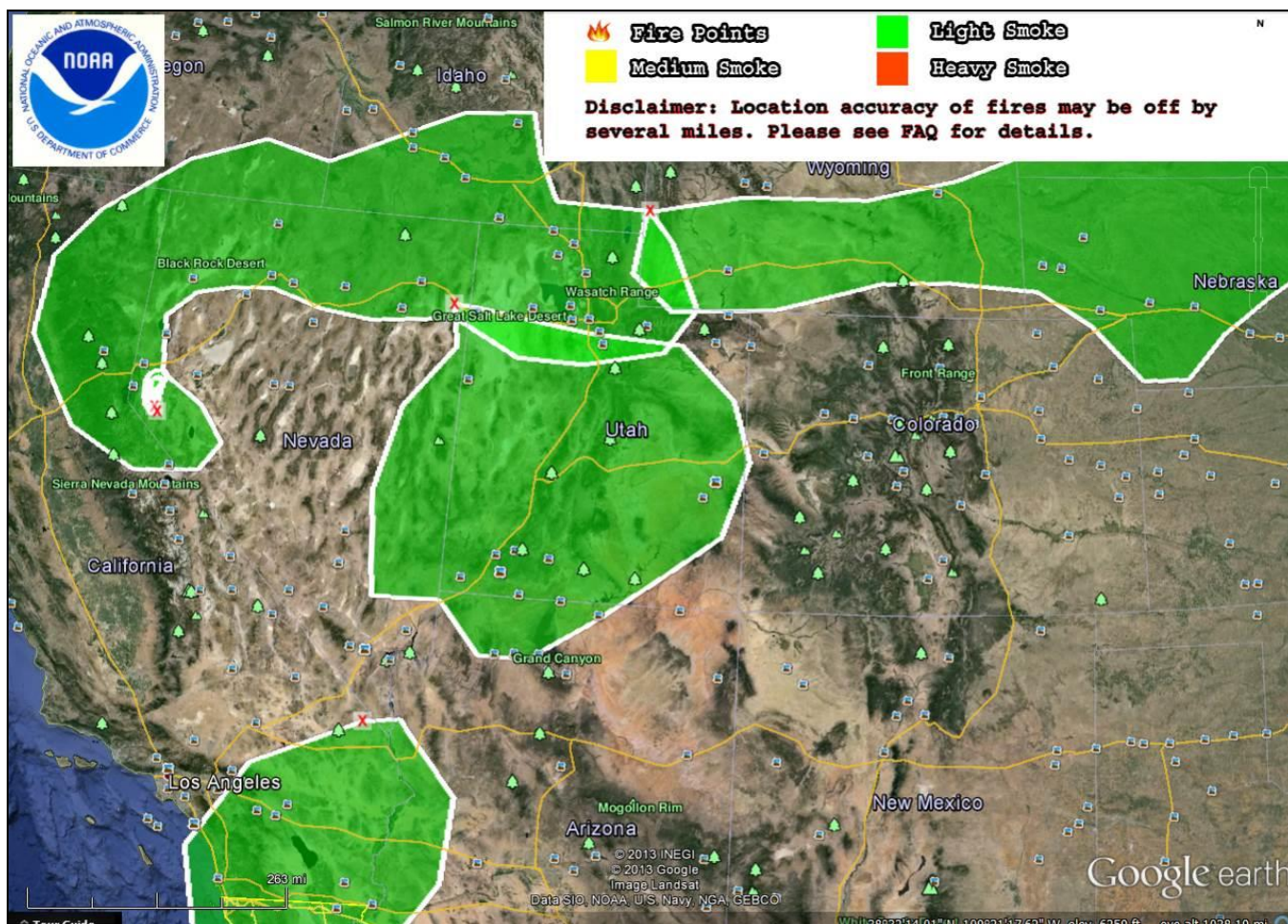
The Hawthorne monitoring station is located at 1675 S. 600 E., Salt Lake City (see Google map). The station is located within a residential area and is equipped to monitor a full complement of constituents.



## Conceptual Model

Ozone is formed in the atmosphere by reactions involving volatile organic compounds (VOCs) and oxides of nitrogen (NO<sub>x</sub>) in the presence of sunlight. Anthropogenic emissions contributing to ozone formation include mobile, stationary and area sources. Wildfires also emit substantial amounts of NO<sub>x</sub> and VOC that may contribute to ozone formation. The ozone season in the Wasatch Front occurs from May through September, coinciding with the wildfire season.

Smoke from wildfires became visibly noticeable in the Salt Lake Valley on July 8, 2013, increasing slowly through July 9. The NOAA smoke map indicates that the sources of the smoke in the Salt Lake Valley were the Nevada wildfires, designated on the map with a red “X.”



The wildfires that contributed smoke to the Salt Lake Valley, based on this smoke map, were the Bison, Eight Mile and North Creek fires.



The Bison fire was located five miles east of Gardnerville, Nevada, along the western slope of the Pinenut Mountain Range in Douglas County.


## Bison

[Incident Information](#) [Announcements](#) [Closures](#) [News](#) [Photographs](#) [Maps](#)

**INCIDENT UPDATED 1:14 HRS. AGO**

### Approximate Location

38.868 latitude, -119.552 longitude [reset view](#)



Hybrid Terrain

Map data ©2013 Google - [Terms of Use](#)

### Incident Overview

The Bison Fire started at approximately 3:30 p.m. on Thursday, July 4, 2013. The lightning-caused fire is located along the western slope of the Pinenut Mountain range in Douglas County, Nevada, and is burning a combination of BLM public lands, Native American allotment lands, and private lands about five miles east of Gardnerville (east of U.S. Highway 395). fi

The Eight Mile fire was located 10 miles east of Alamo, Nevada.

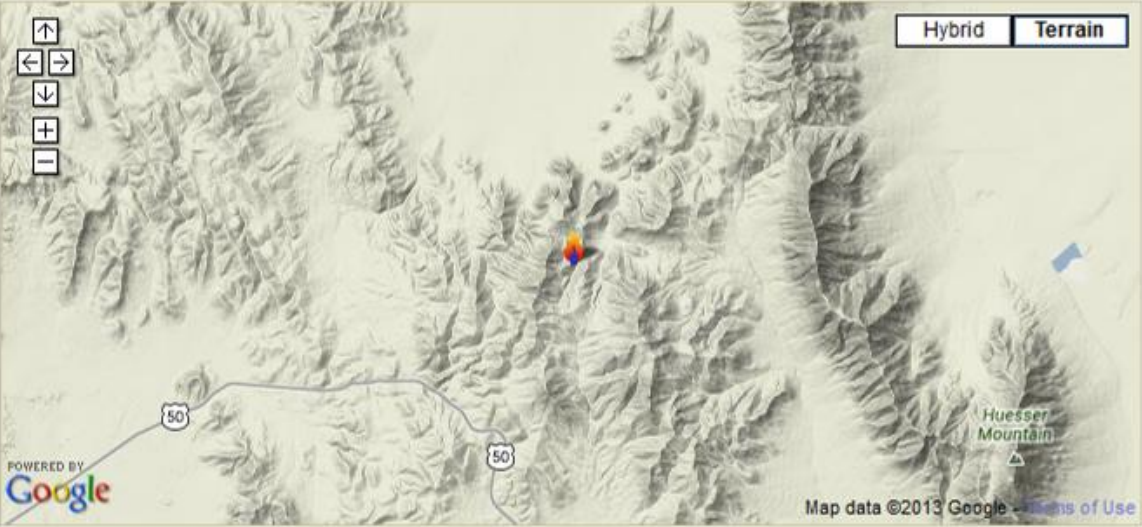
## Eight Mile Fire

[Incident Information](#) [Announcements](#) [Closures](#) [News](#) [Photographs](#) [Maps](#)

**INCIDENT UPDATED 1 DAY AGO**

### Approximate Location

39.466 latitude, -115.051 longitude [reset view](#)



Map data ©2013 Google - [Terms of Use](#)

### Incident Overview

Firefighters continue to confine the Eight Mile Fire burning in the South Pahroc Wilderness 10 miles east of Alamo, Nev. The fire is 50-percent contained and poses no threat to human life or property. The fire was first reported shortly after 11:30 a.m., Monday, July 1. It is burning in steep, rugged terrain and is consuming pinion-juniper, black brush, sagebrush, yucca plants and cheatgrass. The Bureau of Land Management (BLM) is being assisted by the Forest Service and National Park Service.

### Basic Information

Incident Type	Wildfire
Cause	Lightning
Date of Origin	Monday July 01st, 2013 approx. 11:37 AM
Location	10 miles east of Alamo, Nevada
Incident Commander	Tye Mizer

### Current Situation

Total Personnel	11
Size	5,700 acres

The North Creek fire was located 60 miles northeast of Ely, Nevada.

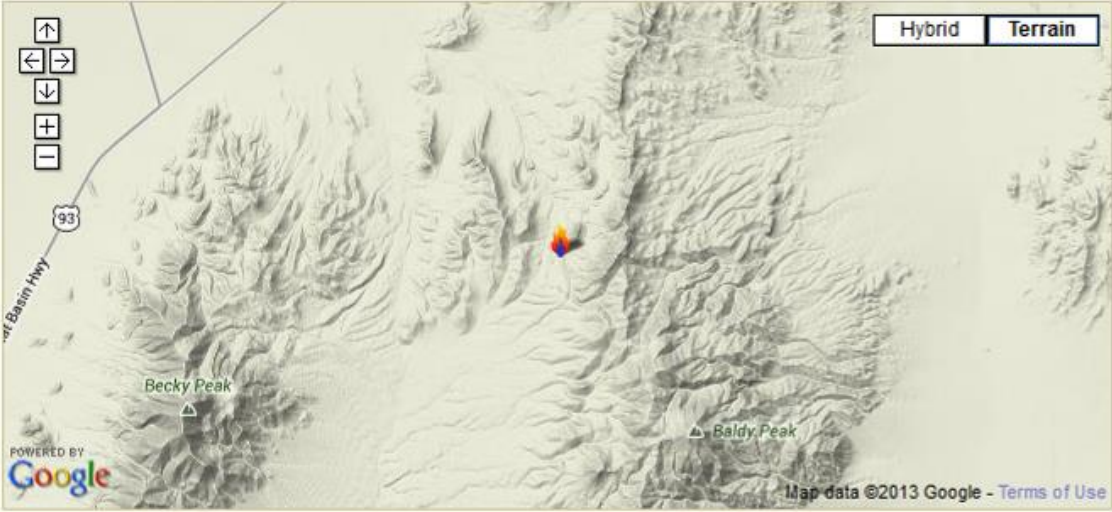
## North Creek Fire

[Incident Information](#) [Announcements](#) [Closures](#) [News](#) [Photographs](#) [Maps](#)

INCIDENT UPDATED 3 DAYS AGO

### Approximate Location

40.018 latitude, -114.452 longitude [reset view](#)



### Incident Overview

The North Creek Fire was fully controlled shortly after 10 a.m., Saturday, July 6.

### Basic Information

Incident Type	Wildfire
Cause	Under Investigation
Date of Origin	Monday July 01st, 2013 approx. 01:00 PM
Location	60 miles northeast of Ely, Nevada
Incident Commander	Jim Flanagan

### Current Situation

Total Personnel	26
Size	1,100 acres
Percent Contained	100%
Estimated Containment Date	Friday July 05th, 2013 approx. 07:00 PM
Fuels Involved	Pinion-juniper, sagebrush
Fire Behavior	Some smoke and single tree torching.
Significant Events	Firefighters yesterday made significant progress on the fire and began to demobilize resources.



## Clear Causal Relationship

### *Visible Smoke*

#### Salt Lake Valley Photo-documentation



This photo was taken from Olympus Cove at 3:47 p.m. on July 8, showing heavy smoke on the Valley floor.

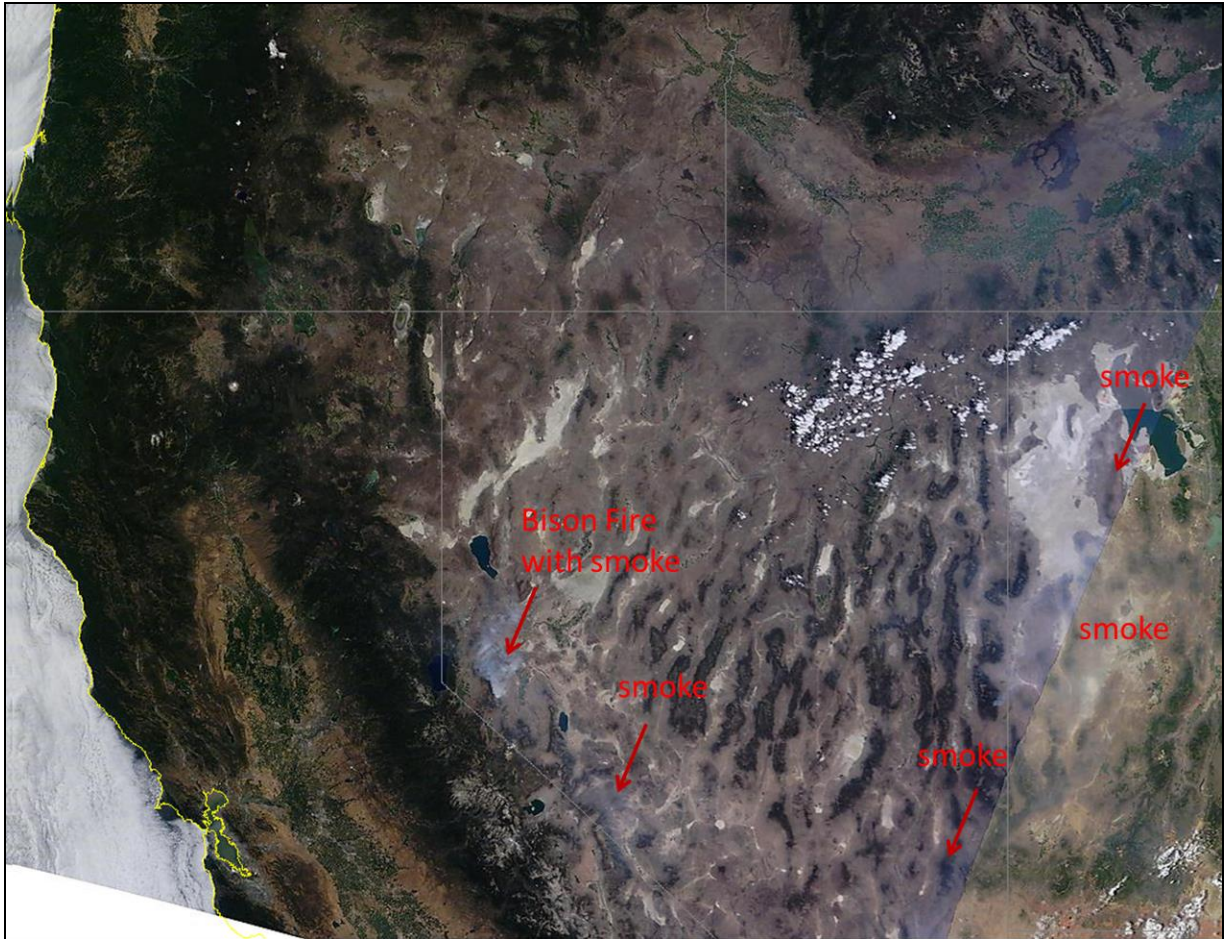


This photo was taken on July 9 at 3:47 p.m. along Wasatch Boulevard, near Olympus Cove. Smoke is visible in the valley.



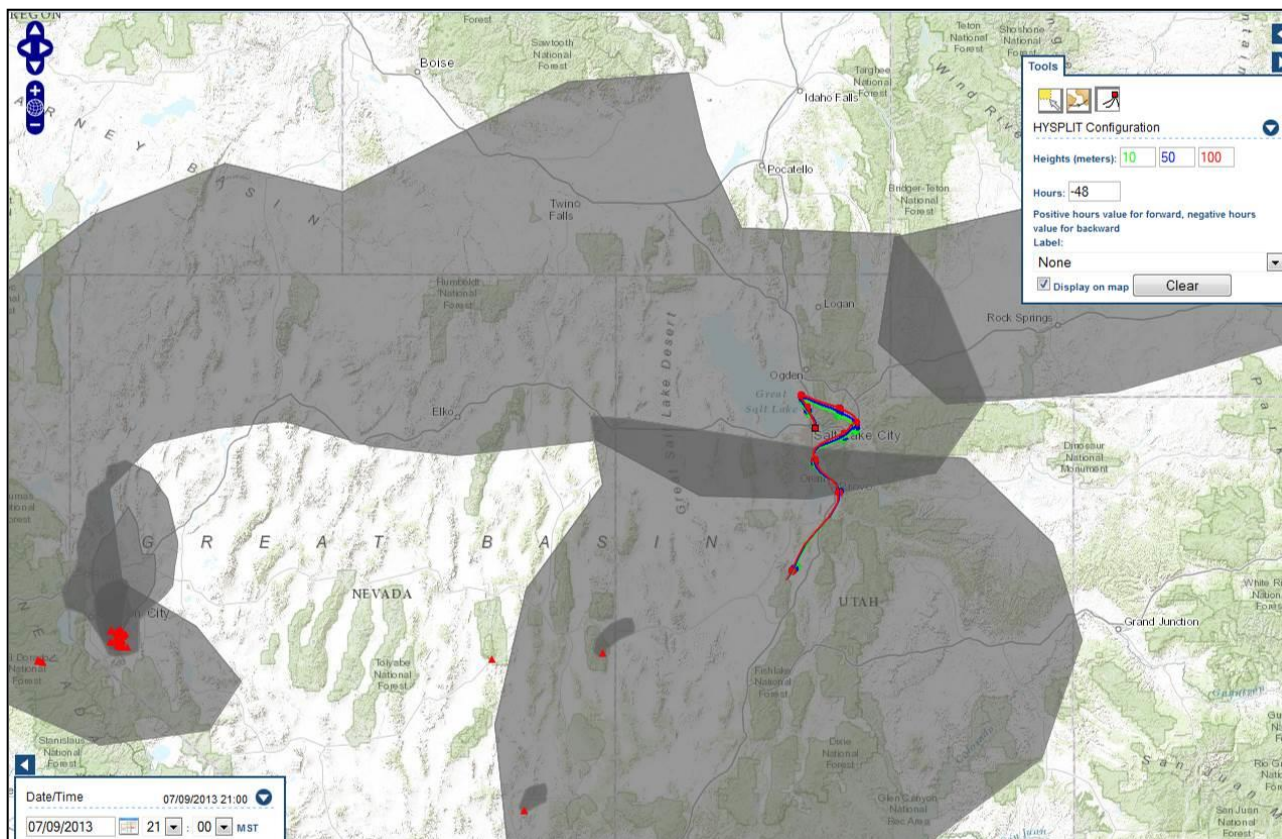
### Visible Satellite Imagery

The MODIS visible satellite image for July 9 confirms smoke (light gray-whitish layer) throughout Nevada, portions of Idaho and most of Utah.

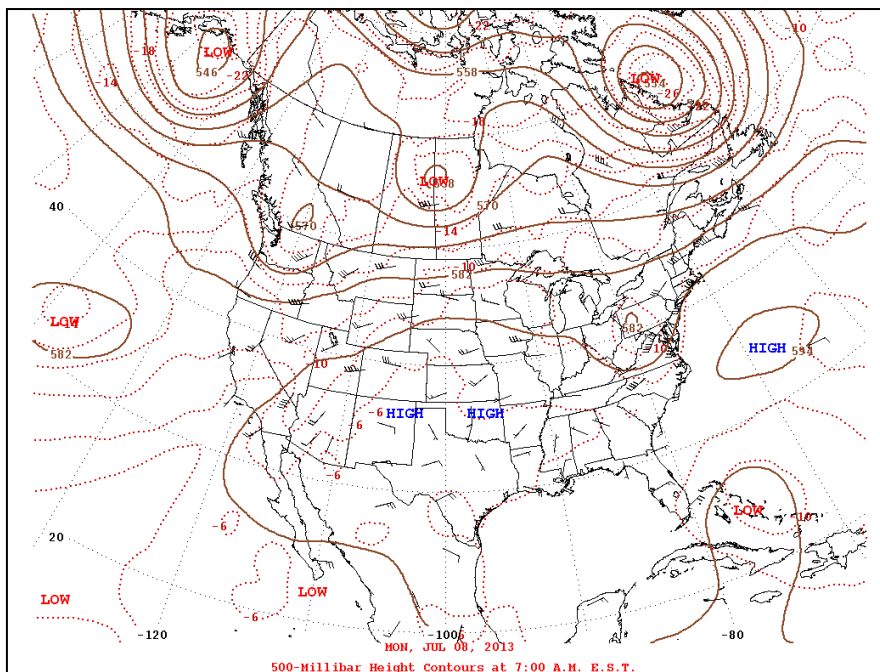


## Smoke Transport

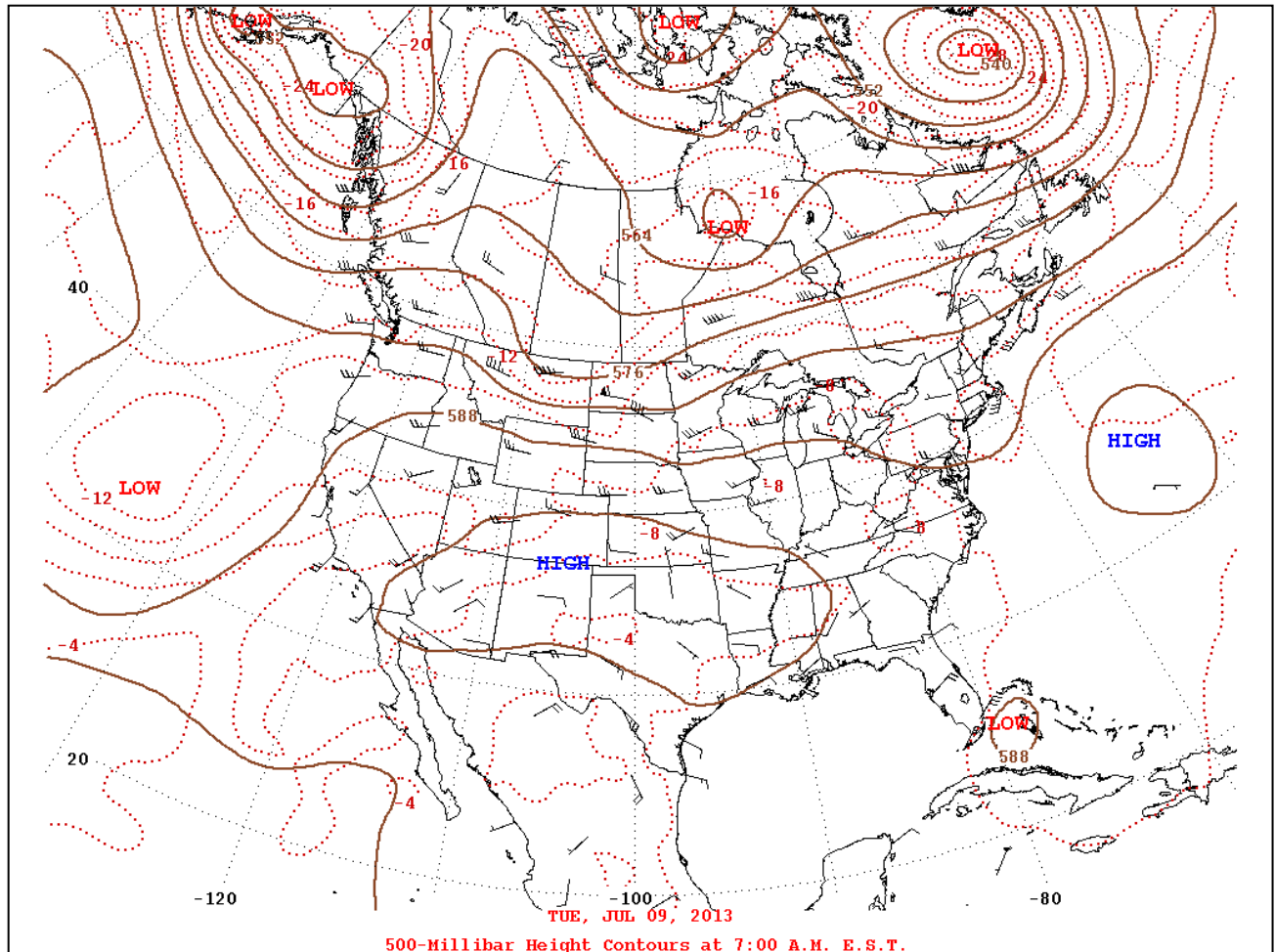
Back trajectory modeling at 10 (in green), 50 (in blue) and 100 (in red) meter heights from the Hawthorne station for 48 hours indicates that smoke reaching the monitor was from a mixture of smoke plumes.



The 500-millibar height contours for July 8 shows that steering winds were directing smoke from the Bison, Eight Mile and North Creek fires, but not the wildfires in southern Utah.





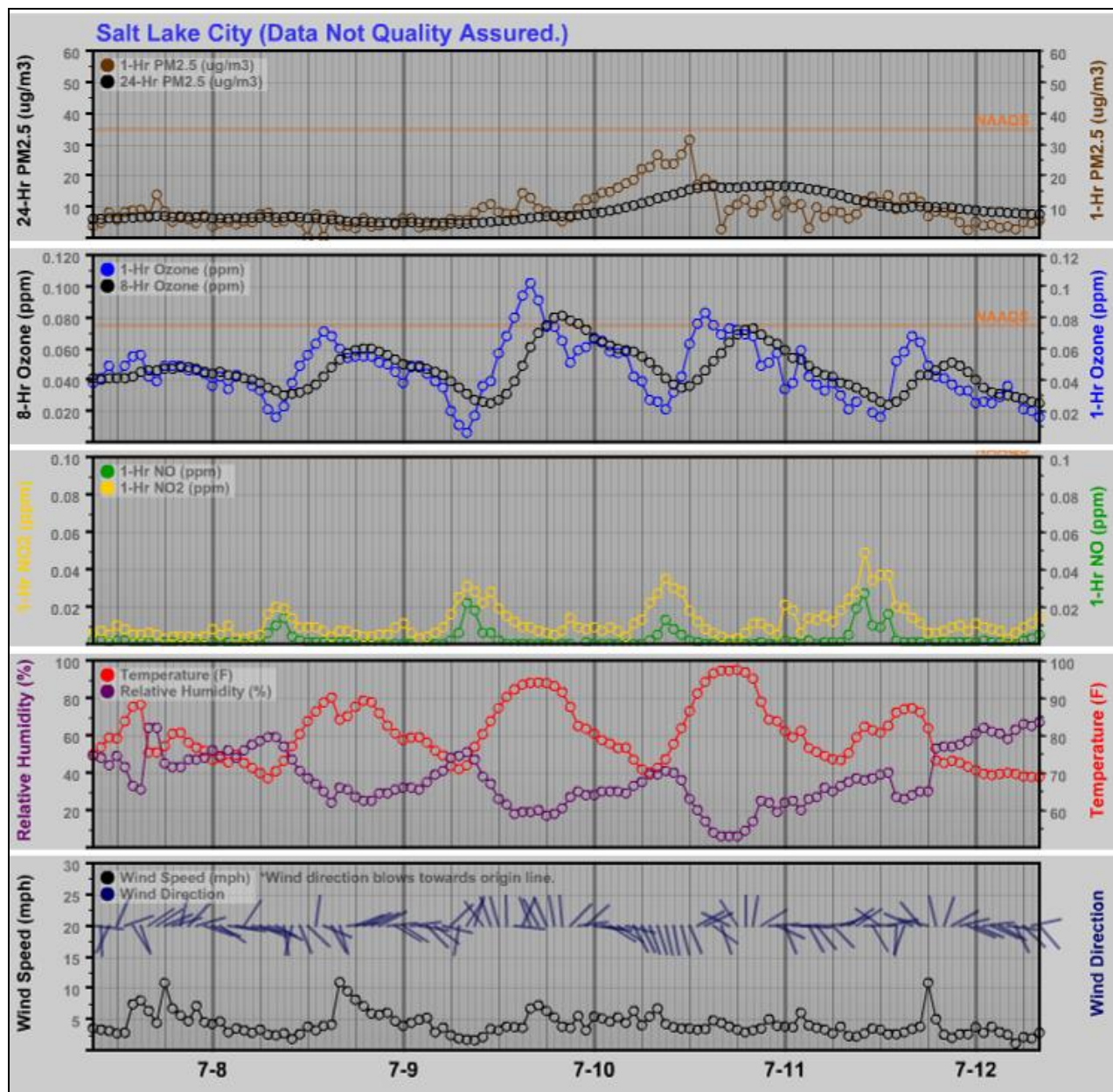


The steering winds shifted on the 9<sup>th</sup> to the south creating a south westerly flow, away from the Bison, Eight Mile and North Creek fires, allowing the Salt Lake Valley to slowly disperse smoke over the event day.



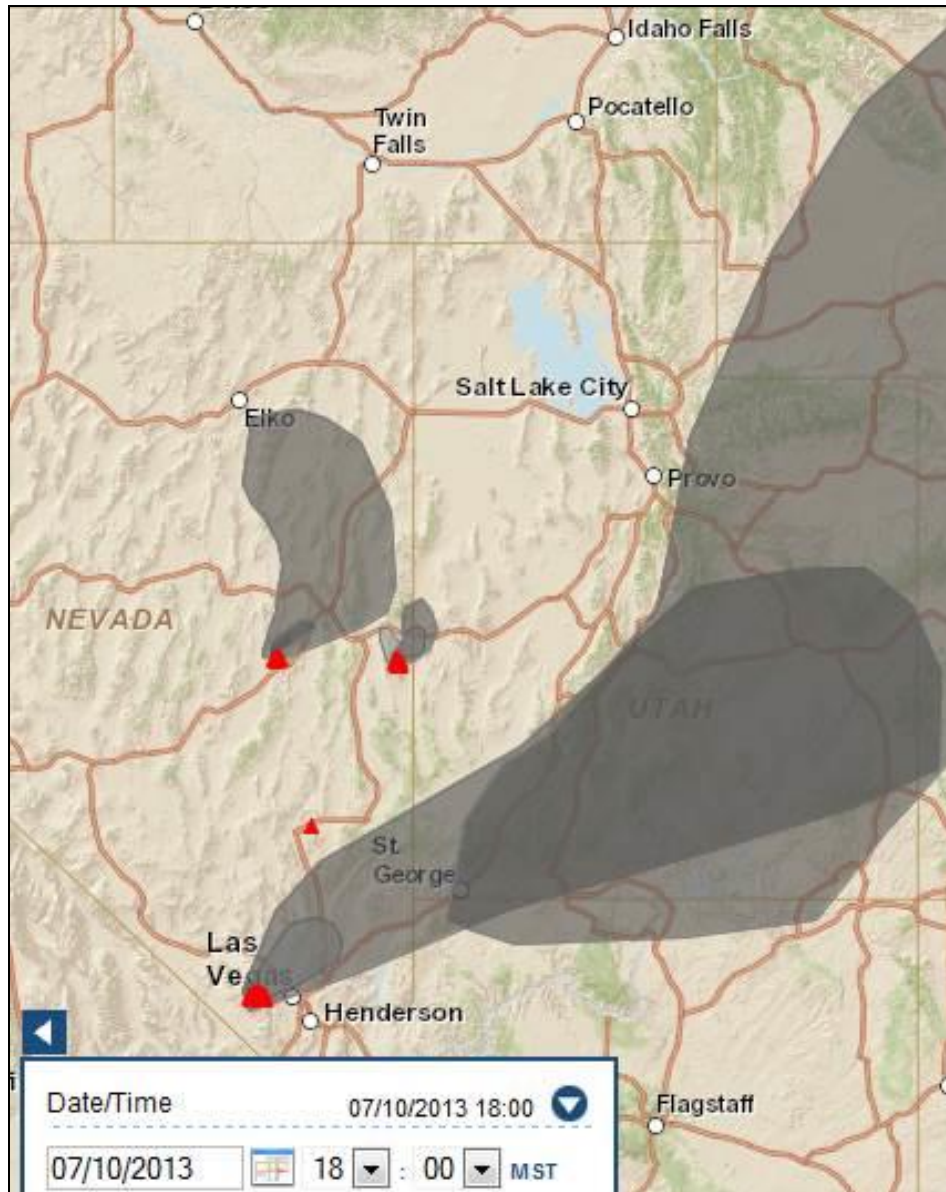
## Affected Air Quality

The trend chart shows the hourly ozone, the 8-hour ozone average, meteorological conditions, NO<sub>x</sub> and PM<sub>2.5</sub> profiles. Hourly ozone levels peaked on the afternoon of the 9<sup>th</sup>, driving the 8-hour average over the 75 ppb standard, shown on the trend chart as an orange line labeled NAAQS. A bump in NO<sub>x</sub> levels at 8 a.m. on the 9<sup>th</sup> is likely associated with morning rush hour emissions. PM<sub>2.5</sub> on the 9<sup>th</sup> trended upward starting at 9 a.m., continuing onto the 10<sup>th</sup>. Heavy smoke was visible on the morning of the 10<sup>th</sup> which would explain the PM<sub>2.5</sub> incline.



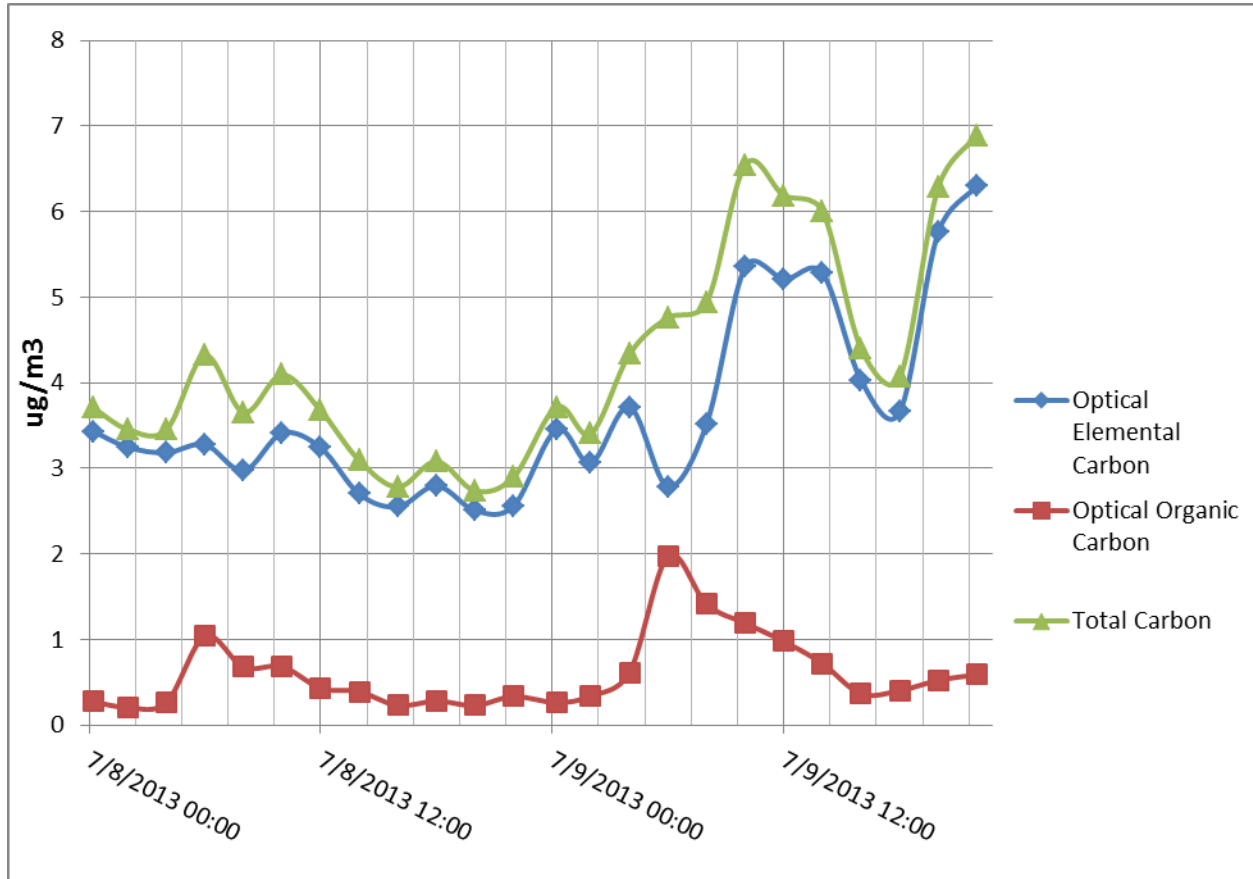
Also notable, is the sharp decline in PM<sub>2.5</sub> mid-day of the 10<sup>th</sup>, which suggests a reduction of incoming smoke into the Valley. This reduction of incoming smoke is verified by the

smoke map which shows smoke from the Bison fire shifted south westerly and the other two fires plumes remained more localized within Nevada. This smoke transport pattern can be explained by the 500-millibar height contours discussed above, where the steering winds shifted south westerly.



### **Fire Biomarkers**

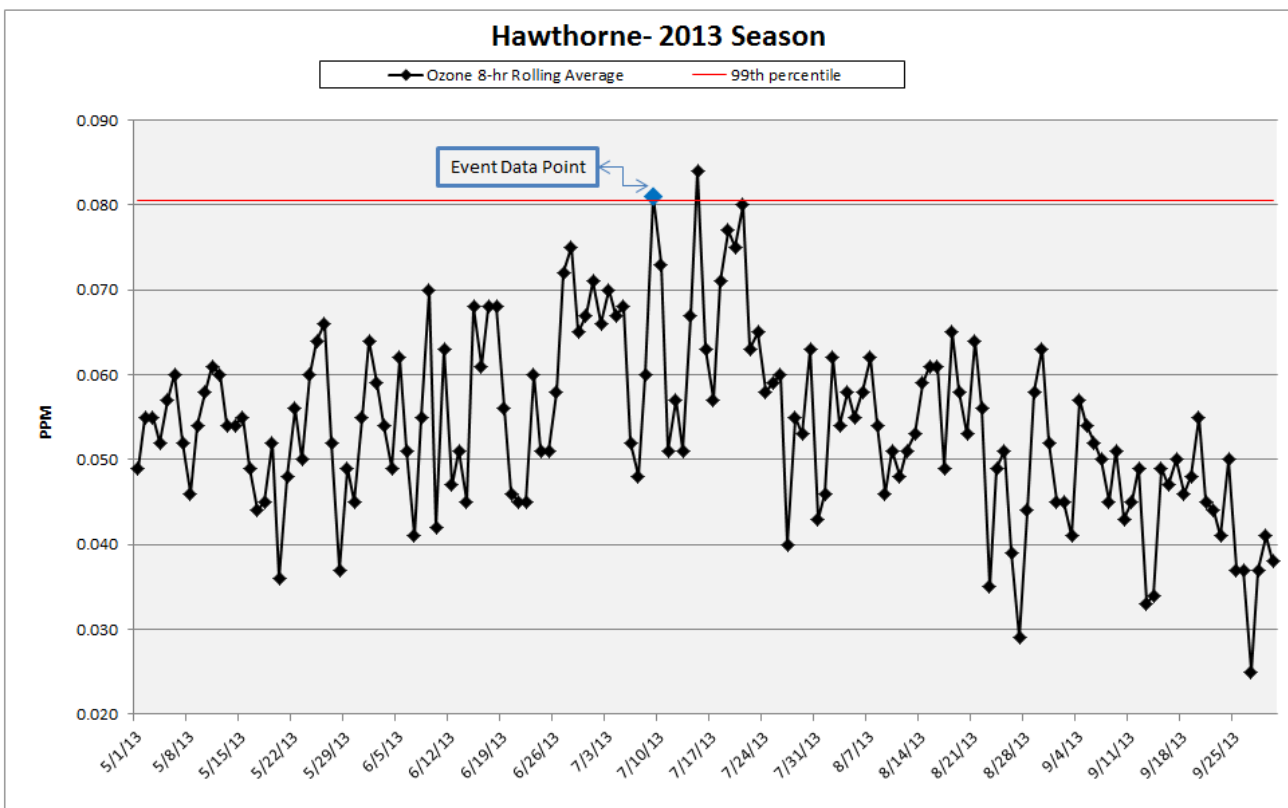
Smoke from wood burning consists of gases and airborne particles. Organic carbon analysis provides a measure of the gaseous phase, while the elemental carbon fraction provides a measure of the particulate matter. Total, organic and elemental carbon values inclined the afternoon of the event day, consistent with the observed ozone peak.





### Historical Fluctuation

The graph presents the 8-hr rolling average for the 2013 ozone season. The blue data point is the event day value of 0.081 ppm or 81 ppb. The red horizontal line represents the 99<sup>th</sup> percentile for the month of July in years 2008, 2009, 2010, 2011, 2012 and 2013. The event day value equals the 99<sup>th</sup> percentile.



Four values within the July 2008 through 2013 data set are suspected to have been influenced by wildfires based on a review of smoke maps and the corresponding ozone data.

Date	Value (ppb)	Wildfire Location(s)
7/8/2008	79	California wildfires
7/9/2008	75	California wildfires
7/2/2012	78	Multiple fires at Fishlake National Forest, Utah
7/9/2012	76	Balanced Rock State Park and Bruneau Desert, Idaho

## **Exceedance But For the Event**

### ***No Unusual Local Emissions***

DAQ staff evaluated compliance records for the event day and staff found no evidence to suggest that anthropogenic emission-generating activities differed significantly between the event day and non-event day. No violations were issued for ozone related contribution activities on or about the event day.

Burning is prohibited during this time of the year. Compliance records show that no violations of the burning rule occurred.

The DAQ meteorology staff issued a yellow-voluntary action air quality alert for the event day. The public is asked to reduce driving and use mass transit on yellow days.

The only difference from the typical emissions pattern was the presence of the wildfire smoke.

## **Conclusions**

1. The 8-hr ozone exceedance meets the definition of an exceptional event because it:
  - ❖ Affected air quality;
  - ❖ Was due to natural wildfires that are not reasonably controllable or preventable; and
  - ❖ The wildfires were caused by lightning strikes which are defined in the rule as a natural event.
2. The 8-hr ozone exceedance data can be excluded because:
  - ❖ The event was not reasonably preventable;
  - ❖ A weight of evidence approach was presented that supports a clear, causal relationship between the 8-hour ozone concentration at the impacted monitor and the specified event;
  - ❖ The measured value is equal to the 99<sup>th</sup> percentile; and
  - ❖ No exceedance would have occurred but for the event based on evidence of no unusual local emissions.

## **Mitigation**

The Exceptional Events Rule requires states to “take appropriate and reasonable actions to protect public health from exceedances or violations of the national ambient air quality standards.” The intent of this section is to describe the State of Utah’s air quality public health protection programs.

### ***Utah Air Quality Public Notifications***

The DAQ website includes air quality forecasting for today and the next two days. The Air Monitoring Center (AMC) provides air pollution information based on daily air quality status. The AMC data is used to determine the relationship of existing pollutant concentrations to the National Ambient Air Quality Standards. There is a three tiered air quality alert system: Green, Yellow (alert days), and Red (actions days). There are five health advisory categories: good, moderate, unhealthy advisories for sensitive groups, and very unhealthy. The AMC advisory is calculated for five major pollutants including ground-level ozone, particulate pollution (particulate matter), carbon monoxide, sulfur dioxide, and nitrogen dioxide. The index also incorporates recommendations for actions to take on days when concentrations are in the red zone, to mitigate the effects of pollution for affected groups and recommendations for industry and citizens that help reduce pollution levels. The outreach program information consolidated in the three day forecast includes the Summer and Winter Control Programs and Choose Clean Air information, as well as consideration for natural hazards like wildfires and dust storms. The web site includes additional information natural hazards.

The UDEQ also offers an electronic mail server (Listserv). Subscribers are automatically notified by e-mail when unhealthy air pollution levels are forecast for the Wasatch Front.

In addition to web site alerts, DAQ also notifies the media in order to maximize public distribution. Given the obvious smoke in the Valley, newscasters reported on the cause of the smoke on all major networks, advising use of public transportation and a warning to sensitive individuals to stay indoors.